

USGS NSF GRIP Opportunity

● USGS Center:	Crustal Geophysics and Geochemistry Science Center
● Project Title:	Processes controlling groundwater quality in uranium in-situ recovery (ISR) mining
● Project Hypothesis or Objectives:	The primary objective of this project is to evaluate the reducing capacity of an aquifer down gradient from a roll-front ore zone to assess the mobility of uranium and other associated elements (e.g. As, Se, Mo, V, and S). Assessing the reducing capacity of the aquifer will require characterization of the mineralogy, geochemistry, and microbiology and their variation across the aquifer. There are three primary tasks to this project: 1) characterization of core material from the down-gradient, reduced zone; 2) chemical extractions and batch experiments using core material; and 3) geochemical modeling. The internship would focus on task two: chemical extractions and batch experiments using core material.
● Duration:	6-12 months
● Internship Location:	Denver, CO
● Area of Discipline:	Geology, chemistry, geochemistry
● Expected Outcome:	This project aims to improve understanding of potential long-term effects of ISR mining and restoration on groundwater quality. In addition, findings are expected to provide input to the decision making process related to the application of existing restoration methods, and may indicate restoration modifications that could reduce costs and improve long-term results.
● Special skills/training Required:	The intern will require knowledge of basic geochemistry, have experience working in a laboratory setting, and have ability to mix reagents and independently conduct extraction/batch experiments with minimal guidance. Additional lab and chemical safety certifications are required and will be provided at the start of the internship.
● Duties/Responsibilities:	The intern will work in collaboration with project members to design and conduct extraction and batch experiments on aquifer sediments that will be obtained from coring in a reduced zone down-gradient

from active ISR uranium mining. The experiments are intended to 1) determine the relative abundance of U and other co-occurring elements of potential concern (e.g. Se and V) in specific mineral phases (carbonate/bicarbonate, extractable Fe(II) and Fe(III) in (oxyhydr)oxide, acid volatile sulfides, and organic carbon) and 2) evaluate the mechanisms affecting the reducing capacity of the aquifer with batch and/or column experiments using variations of reduced and oxidized waters both with and without U(VI) additions. Duties will include; conducting extraction and batch experiments in USGS labs in Denver, reagent preparation, preservation of samples to maintain a reduced environment, and preparation and submittal of resulting solutions for analytical chemistry. The intern will also perform data analysis and interpretation, and contribute to the preparation of a manuscript for a peer-reviewed journal. The intern will report to Jean Morrison with weekly progress updates and will participate in project meetings.

- **Point of Contact or Mentor:** Jean Morrison
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